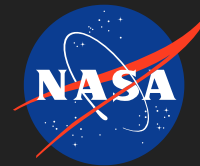


GPU Accelerated Ultrasonic Guided Wave Simulation Toolbox (UGW-Sim) for Virtual Inspection of Complex Aerospace Structures, Phase I

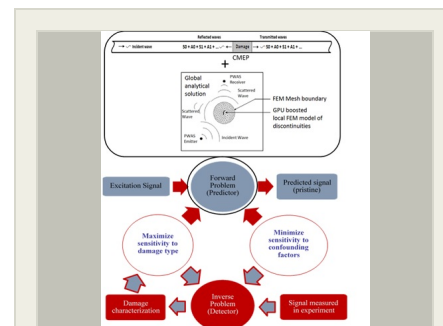
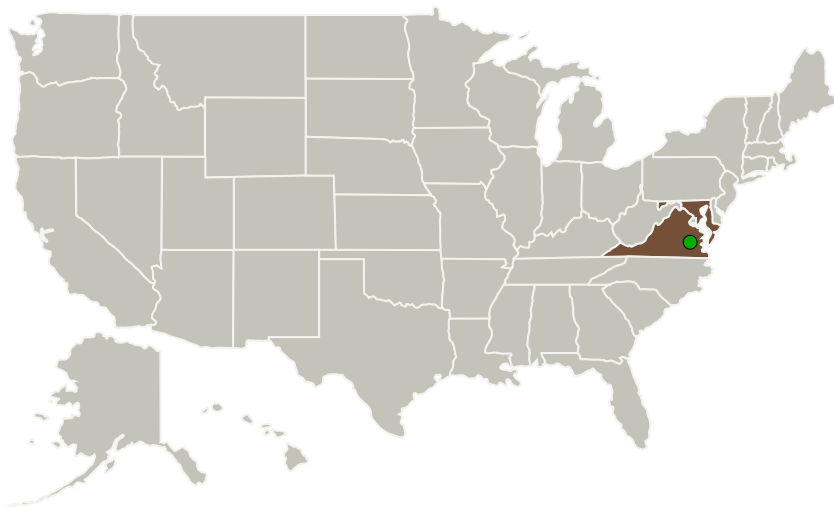
Completed Technology Project (2017 - 2017)



Project Introduction

Ultrasonic guided waves are being used as a NDE/SHM technique to detect flaws and damage in fracture critical structures such as aerospace structures. However, due to the complexity associated with the waveguide problem, direct interpretation of large amount of NDE/SHM data is difficult. A rapid and accurate simulation tool is needed to keep up with the demand automated and timely detection and assessment of damages in complex aerospace structures. We propose to develop a "virtual inspection" simulation toolbox (UGW-Sim) specifically for ultrasonic guided waves. This tool will be able to help analyze and interpret ultrasonic guided wave signals obtained from NDE/SHM measurements for damage detection and identification. It will include modeling of critical structural components such as stiffener and bonded joints and various types of damages that are commonly encountered. The tool will also help determine the optimal sensor placement and inspection parameters to maximize the detectability of various damages. Phase I will focus on the feasibility demonstration of the approach on metal structures and simple defects. Phase II will fully develop the software tool and extend to composite material with complex geometries and defect types.

Primary U.S. Work Locations and Key Partners



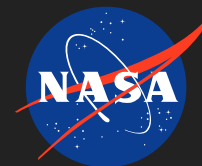
GPU Accelerated Ultrasonic Guided Wave Simulation Toolbox (UGW-Sim) for Virtual Inspection of Complex Aerospace Structures, Phase I Briefing Chart Image

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GPU Accelerated Ultrasonic Guided Wave Simulation Toolbox (UGW-Sim) for Virtual Inspection of Complex Aerospace Structures, Phase I

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Organizations Performing Work	Role	Type	Location
Intelligent Automation, Inc.	Lead Organization	Industry	Rockville, Maryland
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Maryland	Virginia

Project Transitions

**June 2017:** Project Start**December 2017:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/140810>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Intelligent Automation, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

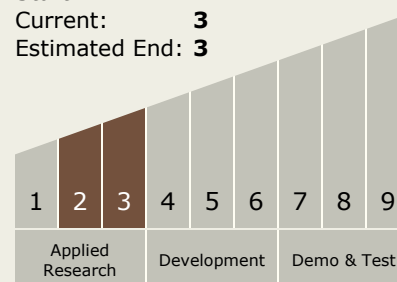
Carlos Torrez

Principal Investigator:

Banibatra Poddar

Technology Maturity (TRL)

Start: 2
 Current: 3
 Estimated End: 3

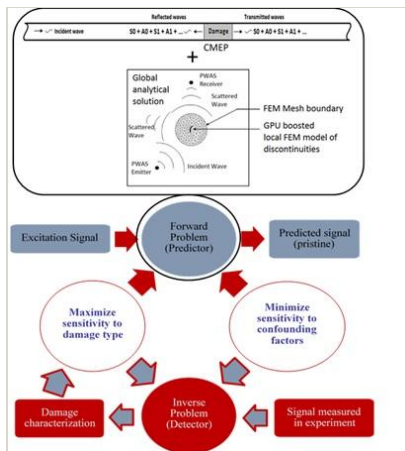


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Images



Briefing Chart Image

GPU Accelerated Ultrasonic Guided Wave Simulation Toolbox (UGW-Sim) for Virtual Inspection of Complex Aerospace Structures, Phase I Briefing Chart Image (<https://techport.nasa.gov/image/128465>)

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.4 Manufacturing
 - └ TX12.4.5 Nondestructive Evaluation and Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System